

PROJECT NUMBER : 1810  
PROJECT TITLE : ART Process Development  
PROJECT LEADER : D. R. Fox  
PERIOD COVERED : February, 1991

### **I. LIQUID ABSORBER PROCESS DEVELOPMENT**

- A. **Objective:** To develop a second-generation supercritical extraction process for nicotine using a liquid absorber rather than stems.
- B. **Results:** M. W. Kellogg is soliciting cost estimates on the liquid absorber design, which is the final phase of the project. All pilot plant work on the liquid absorber has been completed, so the extraction process has been shut down.
- C. **Plans:** Kellogg's final report on the design project is expected in March.

### **II. LIQUID ABSORBENT TREATMENT PROCESS DEVELOPMENT**

- A. **Objective:** To develop separation, utilization, and disposal processes for the liquid absorbent effluent from the second-generation ART extraction process.
- B. **Results:** Bench-scale aerobic and anaerobic systems for treating the liquid absorber effluent continue to operate. The aerobic system has been running with high dilution (50:1) and residence time (8 days) initially, and has produced effluent with a COD of 50 mg/l and no detectable nicotine. As the testing proceeds, less dilution and shorter residence times will be evaluated.

The anaerobic system has been more difficult to start, since oxygen enters the seed during transport and startup, thus inhibiting the methane-forming microorganisms. This system is now being fed intermittently to all the methane-formers to recover.

Development Engineering has completed a design for the scale-up of the activated sludge system. Construction of the aeration vessel and clarifier will begin in March.

Electrosynthesis, a firm contracted to perform exploratory research on electrochemical techniques of handling liquid absorber effluent, reports that nearly 100 percent of the nicotine can be destroyed, but high potential electrodes are required. They are sending a sample of the treated effluent for our analysis to determine the products of the treatment.

- C. **Plans:** Continue process development of the various effluent treatment processes.

### **III. BL PLANT WATER TREATMENT**

- A. **Objective:** Identify and develop techniques for reducing levels of targeted constituents (e.g., nitrates and phosphates) in the discharge water from the BL Plant.

- B. **Results:** Analysis was completed on samples taken from the effluent of the TME, Bauer extractor, and Vetter press on the stem washing process. Filtration indicates that solids, including both tobacco particles and insoluble salts, accounts for about 50 percent of the phosphate loading in these streams, as well as significant effects on COD/BOD. However, filtration had no effect on nitrate and ammonia levels.

The stem washing operation is carried out in a semi-continuous mode, with the process started up and shut down each shift. Samples taken over time indicate that considerable changes occur in total phosphorous and solids concentrations as the process runs. This and other results suggest that it may be possible to alter extraction conditions to improve the selectivity for nitrate reduction.

- C. **Plans:** Tests are planned to determine the size distribution of the solids to determine what type of filtration equipment would be required. Alternatives will also be evaluated for nitrate and ammonia reduction.